

CLAIMS

1. A substrate including an array of photo-detectors for computed tomography, each photodetector of the array having an active area on a first surface of the substrate and a cathode on a second surface of the substrate,  
5 wherein each photodetector of the array is provided with an adjacent conductive via, isolated from the substrate, from the first surface of the substrate to the second surface of the substrate for connecting the active area to the second surface of the substrate, the second surface providing electrical connections for the active areas and the cathodes of the array of photo-detectors.
- 10 2. A substrate according to claim 1 wherein the conductive vias comprise polysilicon.
3. A substrate according to claim 3 wherein the polysilicon is formed on the inner walls of the vias.
4. A substrate according to claim 3 wherein there is provided a further  
15 conductive element from the first side of the substrate to the second within at least one of the conductive vias.
5. A substrate according to claim 3 wherein there is provided a filling material within at least one of the conductive vias.
6. A substrate according to any one of claims 1 to 5 wherein there is provided  
20 a further conductive element connected between the active area of the at least one of the photo-detectors and the respective conductive via.
7. A substrate according to any one of claims 1 to 6 wherein there is provided a further conductive element on the second side of the substrate connected to at least one of the conductive vias.
- 25 8. A substrate according to claim 8 wherein the further conductive element on the second side of the substrate is for making an off-chip connection to the conductive via.
9. A substrate according to any one of claims 1 to 8 wherein the photo-detectors are photodiodes

10. A substrate according to claim 9 wherein the active areas on the first surface of the substrate are anodes.

11. A substrate according to any one of claims 1 to 10 wherein the cathodes of the photo-detectors are formed as a layer on the second surface.

5 12. A substrate according to any one of claims 1 to 11 wherein the photodetectors are photodiodes of a medical imaging system.

13. A substrate according to claim 12 wherein the medical imaging system is a computed tomography system.

10 14. A substrate according to any one of claims 1 to 13 wherein the array of photo-detectors extends in two directions.

15. A substrate according to any one of claims 1 to 14 wherein the array of photo-detectors is arranged into a plurality of sub-arrays of photo-detectors.

15 16. An imaging system comprising: a radiation detector including a photo-detector array formed in at least one substrate according to any one of claims 1 to 15, a radiation source facing the radiation detector, and means for controlling the radiation detector and the radiation source.

17. An imaging system according to claim 16 wherein the radiation source is an X-ray tube equipped with a high-voltage generator.

20 18. An imaging system according to claim 16 or claim 17 wherein the radiation detector and the radiation source are radially mounted in a cylindrical scanning structure.

19. An imaging system according to any one of claims 16 to 18 wherein the means for controlling comprises a computer system.

25 20. A method of manufacturing an array of photo-detectors for computed tomography comprising: providing for each of the photodetectors of the array an active area on a first surface of a substrate; providing for each of the photo-detectors a cathode on a second surface of the substrate; forming for each of the photo-detectors an adjacent conductive via, electrically isolated from the substrate, through the substrate from the first surface of the substrate to a second  
30 surface of the substrate; connecting the active areas to the conductive vias such

that the active areas are connected to the second surface of the substrate; and providing at the second surface electrical connections for the active areas and the cathodes of the array of photo-detectors.

- 5 21. A method according to claim 20 wherein the conductive vias comprise polysilicon.
22. A method according to claim 21 further comprising the step of forming polysilicon on the inner walls of the vias.
- 10 23. A method according to claim 22 further comprising the step of providing at least one further conductive element from the first surface of the substrate to the second surface within at least one of the conductive vias.
24. A method according to claim 22 further comprising the step of providing a filling material within at least one of the conductive vias.
- 15 25. A method according to any one of claims 20 to 24 further comprising the step of providing at least one further conductive element connected between at least one of the active areas and at least one of the conductive vias.
26. A method according to any one of claims 20 to 25 further comprising the step of providing at least one further conductive element on the second surface of the substrate connected to at least one of the conductive vias.
- 20 27. A method according to claim 25 wherein the further conductive element is a contact pad.
28. A method according to claim 26 or claim 27 wherein the further conductive element on the second surface of the substrate is provided for making an off-chip connection to the conductive via.
- 25 29. A method according to any one of claims 20 to 28 wherein the photo-detectors are photodiodes.
30. A method according to claim 29 wherein the active areas on the first surface of the substrate are anodes.
31. A method according to any one of claims 20 to 30 wherein the cathodes of the photo-detectors are formed as a layer on the second surface of the substrate.

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32. A method according to any one of claims 20 to 31 wherein the photo-detectors are photodiodes of a medical imaging system.

5 33. A method according to claim 32 wherein the medical imaging system is a computed tomography system.

34. A method according to any one of claims 20 to 33 wherein the array of photo-detectors is provided as a plurality of sub-arrays of photo-detectors.

10 35. A radiation detector including photo-detectors formed in at least one substrate according to any one of claims 1 to 15.

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